Claims

1. A memory hub, comprising:

a first ingress interface for receiving from a source port packets having associated ingress flows;

a second ingress interface for outputting packets or cells to a switch fabric; and

an ingress controller that queues the packets or cells according to the associated ingress flows.

2. A memory hub according to claim 1 including an ingress traffic manager that schedules how the packets or cells are output to the switch fabric.

3. A memory hub according to claim 2 wherein the ingress traffic manager schedules outputting of the packets or cells on a per flow basis or on a per Class of Service basis per destination basis.

4. A memory hub according to claim 2 wherein the ingress controller manages memory operations for queuing the packets or cells independently of controls from the ingress traffic manager.

5. A memory hub according to claim 4 wherein the ingress controller and the ingress traffic manager are separate circuits operating on separate integrated circuits.

6. A memory hub according claim 1 including a Class of Service queuer that receives packets or cells output from the second ingress interface on a per flow basis and sends the packets or cells to the switch fabric on a per Class of Service associated basis.

7. A memory hub according to claim 2 wherein the ingress traffic manager directs the ingress controller to drop packets or cells for ingress flows that back up.

8. A memory hub according to claim 1 including ingress queues maintaining pointers to the queued packets or cells according the ingress flows.

9. A memory hub according to claim 1 including egress flow fields for assigning egress flow Ids to the packets or cells according to the associated ingress flows.

10. A memory hub according to claim 1 including forwarding label fields for assigning forwarding labels to the packets or cells according to the associated ingress flows.

11. A memory hub according to claim 10 wherein the forwarding label fields contain information for establishing a path in the switching fabric to a destination port.

12. A memory hub according to claim 1 including Class of Service fields for assigning Class of Service values to the packets or cells according to the associated ingress flows.

13. A memory hub according to claim 1 including:

an egress controller having a first interface for receiving packets or cells output from the switch fabric having associated egress flows;

a second interface for transferring the packets to a destination port; and

an egress controller configured to manage how the packets are queued to the destination port according to the associated egress flows.

14. A memory hub according to claim 13 including egress queues for maintaining pointers to the packets or cells received from the switch fabric according the associated egress flows.

15. A memory hub according to claim 14 including forwarding label fields for identifying forwarding labels for the egress queues.

16. A memory hub according to claim 15 wherein the forwarding label fields identify source ports.

17. A memory hub according to claim 14 including a content addressable memory that maps the egress flows to the egress queues.

18. A memory hub according to claim 13 including an egress traffic manager that receives egress flow information from the egress controller and schedules the egress controller to output packets to the destination port according to the egress flow information.

19. A memory hub according to claim 14 wherein the egress traffic manager notifies the egress memory hub to drop packets or cells for egress queues that back up.

20. A method for forwarding packets in a network processing device, comprising:

receiving packets associated with ingress flows;

queuing the packets according to the associated ingress flows;

identifying ingress flow information for the packets; and

outputting the queued packets according to the ingress flow information.

21. A method according to claim 20 including managing memory operations for queuing the packets in a first integrated circuit and independently managing in a second integrated circuit how the queued packets are scheduled for being output.

22. A method according to claim 20 including outputting the packets on a per flow basis or on a per Class of Service basis.

23. A method according to claim 20 including outputting the queued packets on a per flow basis and requeuing the output packets for outputting to a switch fabric on a per Class of Service basis.

24. A method according to claim 20 including identifying egress flows for the ingress flows and assigning the identified egress flows to the packets before being output.

25. A method according to claim 20 including identifying forwarding labels for the ingress flows and assigning the identified forwarding labels to the packets before being output.

26. A method according to claim 20 including identifying a Class of Service for the ingress flows and assigning the Class of Service to the packets before being output to the switch fabric.

27. A method according to claim 26 including modifying the assigned Class of Service and assigning the modified Class of Service to the packets before being output.

28. A method according to claim 20 including tracking ingress flow information for the packets and scheduling the packets for outputting to a switch fabric according to the tracked ingress flow information.

29. A method according to claim 28 including dropping queued packets when a back up is indicated by the tracked ingress flow information.

30. A method according to claim 20 including receiving the packets with associated egress flows from a switch fabric and queuing the packets for outputting to destination ports according to the egress flows.

31. A method according to claim 30 including associating forwarding labels and ingress flows with the egress flows for the packets received from the switch fabric.

32. A method according to claim 31 including identifying egress flows that are backing up and notifying source ports causing the back up using the ingress flows and forwarding labels associated with the identified egress flows.

33. A method according to claim 20 including identifying unused egress queues for each egress port associated with a multicast packet, using a common CAM value to map to the unused egress queues in each egress port, and assigning the CAM value to the multicast packet as an egress flow value.

34. A method according to claim 33 including:

receiving the multicast packet from a switch fabric;

using the CAM value in the multicast packet to access a content addressable memory; and

using an egress queue mapped by the content addressable memory as the egress queue for the multicast packet.

35. A method according to claim 24 including tracking packet size information for the egress flows and queuing the packets for outputting to destination ports according to the tracked packet size information.

36. A method according to claim 20 including providing an Egress flow Id, Class of Service, or forwarding label value with the received packets.

37. A method according to claim 20 including providing an Egress flow Id, Class of Service, or forwarding label value in a memory hub data structure.

~~38.~~ A memory hub, comprising:

a first interface for receiving packets or packet fragments having associated flow Ids;

a second interface for outputting the packets or packet fragments; and

a controller that queues the packets or packet fragments in a memory according to the associated flow Ids and dequeues the packets from the memory according to the associated flow Ids.

39. A memory hub according to claim 38 wherein the controller receives control signals identifying the flow Ids for queuing the packets and receives control signals identifying the flow Ids for dequeuing the packets.

40. A memory hub according to claim 38 wherein the first interface receives the packets or packet fragments from a switch fabric and the second interface outputs packets to an egress packet processor.

41. A memory hub according to claim 40 including another memory hub having a first interface configured to receive packets from the egress packet processor and a second interface configured to output packets to an egress interface.

42. A memory hub according to claim 40 including a traffic manager that receives packet lengths associated with the packets output from the egress packet processor.

43. A memory hub according to claim 40 including a traffic manager that receives packet lengths associated with the packets received from the first interface.

44. A memory hub according to claim 38 including a third interface configured to receive the packets with updated packet headers back from the egress packet processor and a fourth interface for outputting the updated packets to an egress interface circuit.

45. A memory hub according to claim 38 wherein the packets or packet fragments include an egress flow Id, Class of Service, or forwarding label value.

46. A memory hub according to claim 38 including a data structure that includes an egress flow Id, Class of Service, or forwarding label value.

47. A memory hub according to claim 38 wherein the controller sends packet length values and Class of Service values to a traffic manager associated with the flow Ids.